



Jalalvand, M., Stira, J. S., Yu, H., Longana, M., Potter, K., & Wisnom, M. (2015). *On the stiffness of intermingled discontinuous hybrid composites*. Abstract from V ECCOMAS Thematic Conference on the Mechanical Response of Composites, Bristol, United Kingdom.

Peer reviewed version

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# ON THE STIFFNESS OF INTERMINGLED DISCONTINUOUS HYBRID COMPOSITES

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The stiffness of composite materials is usually found using the rule of mixture and the obtained results are in good agreement with the experiments. However, the widely applied rule of mixture is one of two possible type of rule of mixtures: (i) parallel and (ii) series. Recently, intermingled discontinuous hybrid composite with high carbon-volume fraction has been made a novel type of hybrid at the University of Bristol [1] and the obtained tensile modulus of these new type of composite did not follow the broadly accepted parallel rule of mixture. Figure (1) indicates the calculated initial modulus of the glass/carbon hybrid composite based on two parallel and series rules of mixture compared against the experimental results. Obviously, in high relative carbon ratios, the obtained experimental results do not match the parallel rule of mixture and tends toward series rule of mixture.

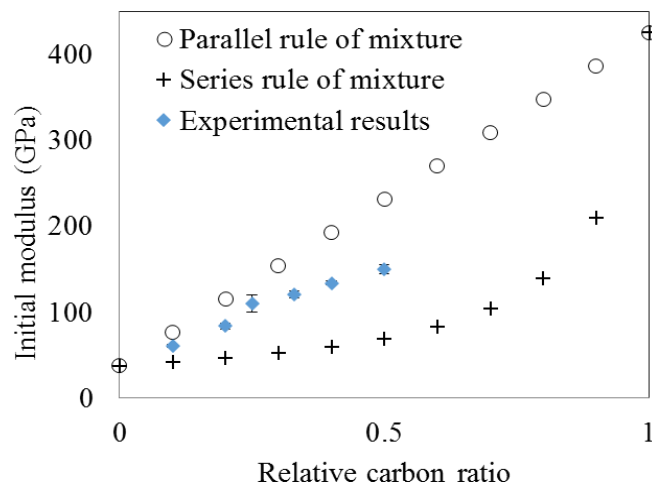


Figure 1. Experimental initial modulus of glass/carbon hybrid composite compared against parallel and series rule of mixture

The aim of this paper is to investigate this phenomenon using Finite Element approach. For this purpose, a random distribution of glass and carbon fibres is assumed for the discontinuous hybrid and the effect of fibre arrangement is studied. This modelling will then help to modify the recently proposed analytical method to produce more accurate results.

## References

- [1] H Yu, M Jalalvand, MR Wisnom, KD Potter, Hybrid composites with aligned discontinuous fibres, 16th European Conference on Composite Materials, ECCM 2014; Seville; Spain; 22 June 2014 through 26 June 2014